Does Intellectual Capital Affect Corporate Performance?

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Abstract

Intellectual capital (IC), intangible assets and know-how capital have been used by scholars to extensively describe the particular factors corporations use to create products and services. Moreover, many studies in the field of capital market research, financial and management accounting have examined the importance of IC for corporate performance. Those studies, examining mature listed corporations, support the claim/hypothesis that IC has a positive impact on market value and financial performance. This is the main motivation of the present study. Thus, the aims of this study are: (a) to discuss the main concepts of IC (human capital, structural capital and relational capital); (b) to present a measure of IC increasingly applying in business world, namely the Value Added Intellectual Coefficient (VAIC™) developed by Pulic and his research team at the Austrian IC Research Centre (Pulic, 1998; 2000); and finally (c) to present results of research conducted in international markets and preliminary results of this application on Greek listed corporations. This study is going to further extended in Greek and Austrian context and data will be processed and tested both separately and merged.

Key words: **Intellectual capital (IC), performance, VAIC**

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1. Introduction

Peter Drucker (1999) clearly presents the Intellectual Capital (IC) importance. He states '*The truly unique contribution of management in the 20th century was the manual worker manufacturing. The most important contribution management needs to make in the 21th century is to increase the productivity of knowledge work and knowledge workers. The most valuable asset of a 20th century company was its production equipment. The most valuable asset of a 21th century company institution will be its knowledge workers and productivity*'. So, according to Pulic (2004), who also refers to the above statement, in order to understand the efficiency of intellectual capital it has to be measured.

Moreover, the need of knowledge has been primarily discussed some thousand years ago. Nick Bontis (1998) starts his study on Intellectual Capital and how it develops models and models, with the seminal statement of the Greek philosopher Aristotle (384 – 322) BC as follows: '*All men by nature desire knowledge*'.

According to Bontis (1998, p. 63) and consistent to Stewart (1997) and Sveiby (1997) 'Intellectual Capital has been considered by many, defined by some, understood by a select few, and formally valued by practically no one. Thus, the increase need of defining and presenting measures and models measuring the impact of intellectual capital have been more than imperative.

On the other hand, studies from both emerging and mature International markets started to bring the first empirical results to the academic community and to practitioners.

The aim of the present study is to present the basic concepts of Intellectual Capital, to show selective results from studies coming from the International market, to comment on Pulic (1998 and 2000) development of Value Added Intellectual Capital Coefficient (VAIC) and to conduct an empirical study both in Greece and Austria examining the association of VAIC and corporate performance. The rest of the paper is as follows: Next section is the literature review where basic concepts of Intellectual Capital are discussed and results from international research are presented. Then, the Methodology part deals with the Value Added Intellectual Capital Coefficient (VAIC) and its development. Next follows the empirical results from the study of Firer and Williams (2003) and preliminary and comparative results from the Greek capital market are also presented. Finally, preliminary conclusions are presented and discussed since the study is still in the process.

2. Literature Review

The consistent increasing difference between company's book and market value has drawn wide attention by scholars to explore the invisible value omitted from financial statements (see: Lev, 2001; Lev and Radhakrishnan, 2003; Chen, Chen and Hwang, 2005). According to Lev (2001) over the period 1977 to 2001, the market to book (M/B) value ratios of US Standard and Poors (S&P) 500 corporations moved upwards from slightly greater that 1 to over 5. This implied that almost 80 per cent of corporate value has not been reflected in financial reporting.

According to Chen, Chen and Hwang (2005, p. 159) '*the limitation of financial statements in explaining firm value underline the fact that the resource of economic value is no longer the production of material goods, but the creation of intellectual capital*'. Moreover, Edvinsson and Malone (1997) clearly explain that Intellectual Capital includes Human Capital and Structural Capital wrapped up in customers, processes, databases, brands and

systems. Kaplan and Norton (2004) go further and state that Intellectual Capital has been playing an increasingly important role in creating corporate sustainable competitive advantage.

Main *definitions on Intellectual capital*

Klein and Prusak (1994) define Intellectual Capital as a *packaged useful knowledge*. According to Sullivan (2000) it comprises knowledge, lores, ideas and innovations. While many definitions have been presented, the vast majority of scholars and expertises agree with the definitions proposed by (Bontis, 1999; Edvinsson and Malone, 1997; Edvinsson and Sullivan, 1996; Lynn, 1998; Roos et al., 1997) that an organisations Intellectual Capital consists of: Human Capital (HC), Structural Capital (SC) and Relational Capital (RC).

Human Capital captures the knowledge, education, professional skills, attitudes and experience and creativity of company's employees. *Structural Capital* consists of innovation capital (e.g. patents), process capital (e.g. organisational procedures and processes), routines, systems and culture that contribute to employees in their pursuit of the excellence of organisational performance. Finally, *Relational Capital* captures the value of relationships with those stakeholders external to the organisation, such as the knowledge of market channels, customers, suppliers and regulatory agencies. Thus, CIMA, 2000) summarises that Intellectual Capital is the possession of knowledge and experience, professional knowledge and skills, good relationships, and technological capacities, that when adopted and applied enhance organisations' competitive advantage.

Although the Intellectual Capital as a concept gains particularly increasing popularity, since it is believed that it drives company value and competitive advantage, an appropriate measure of company's Intellectual Capital is still in infancy (Chen, Chen and Hwang, 2005). However, a seminal work conducted by Ante Pulic and his colleagues at the Austrian IC Research Centre (Pulic, 1998; 2000; Pulic and Borhemann, 1999) introduced the Value Added Intellectual Capital Coefficient™ (VAIC™).

Empirical Results from the International market

Roos and Roos (1997) reported the results and conclusions from an extensive study among small and medium sized companies in Scandinavia. They suggested the adoption of, alongside the 'Balance Sheet approach' of a 'Profit and Loss' approach which will be able to help companies to monitor the flows among different types of Intellectual Capital and between Intellectual Capital and financial capital. Bontis (1998) based on a sample of MBA students at the Ivey School of Business in the University of Western Ontario, performed an empirical pilot study exploring the development of several conceptual measures and models regarding Intellectual Capital and its impact on business performance. He proved that the final retained, subjective measures and optimal structural specification show a valid, reliable, significant and substantive association between Intellectual Capital and business performance.

Bart (2001) measured the mission effect in Human Intellectual Capital. Data on mission statement practices have been gathered over the ten past years (1990-2000) as part of an ongoing research project. Moreover, a questionnaire has been completed by 559 organisations producing one of the largest data set on mission statement practices in the world. They showed that mission statements may indeed have a valid place in the measurement and reporting of an organisation's Intellectual Capital. Firer and Williams (2003) investigated the association between the efficiency of value added by the major components of a company's resource base (physical capital, human capital and structural capital) and three traditional performance measures (e.g. profitability, productivity and market valuation). Based on a data set from 75 publicly traded companies from South Africa, from business sectors heavily reliant on Intellectual capital, they found that the associations between the efficiency of Value Added by a company's major resource bases and profitability, productivity and market valuation are generally limited and mixed. In general, the physical capital remains the most significant underlying resource of corporate performance in South Africa, something rather logic for the emerging markets. They used VAIC™ as a proxy.

Chen, Chen and Hwang (2005) using data drawn from Taiwanese publicly traded companies and the VAIC™ as the efficiency measure of capital employed and intellectual capital, they examined the relationship between company value creation efficiency and company's market-to-book value ratios, and explored the relation between intellectual capital and company's current and future financial performance. They proved that (a) company's intellectual capital has a positive impact on market value and financial performance, (b) investors may place different value on the three components of value creation efficiency (physical, human and structural capital), and (c) R&D expenditures may capture additional information on structural capital and has positive effect on firm value and profitability.

Tayles, Pike and Sofian (2007) investigated the association of Intellectual Capital, Management Accounting practices (e.g. performance measurement, planning and control, capital budgeting, and risk management) and corporate performance. Using a sample of 119 large companies in Malaysia and based on a questionnaire survey, they could suggest some evolution in management accounting practices for companies investing heavily in Intellectual Capital.

3. Methodology

The present study follows the methodology adopted by Firer and Williams (2003). They studied a sample of 75 publicly traded companies in South Africa and explored the relationship between Intellectual Capital and Traditional measures of corporate performance. Their main finding was that physical capital still remains the most significant underlying resource of corporate performance in South Africa. They used as a proxy for Intellectual Capital the VAIC™ while on the other side they had profitability (net income to book value of total assets), productivity (total revenues to total book value of assets) and market valuation (total market capitalisation to book value of net assets).

The *Independent* variable: *VAIC™*

For our study we also use the VAIC™ as the proxy for Intellectual Capital (the *independent* variable). Pulic (1998) formally presents VAIC™ as the sum of three separate indicators; (a) *Capital employed* efficiency (CEE), (b) *Human capital* efficiency

(HCE) and *Structural capital* efficiency (SCE). *Capital employed* efficiency is the indicator of Value Added efficiency of the capital employed. *Human capital* efficiency is the indicator of Value Added efficiency of Human capital, while *Structural capital* efficiency indicates the Value Added efficiency of structural capital.

This relationship is mathematically formed as follows:

$$VAIC_jTM = CEE_j + HCE_j + SCE_j$$

Where

$VAIC_j^{TM}$	is the Value added Intellectual coefficient for company $_j$
$CEE_j = VA_j / CE_j$	is the Value added capital employed coefficient for company $_j$
$HCE_j = VA_j / HC_j$	is the Human capital coefficient for company $_j$
$SCE_j = SC_j / VA_j$	is the Structural capital value added for company $_j$

While

CE_j	is the Book value of the net assets for company $_j$
HC_j	is the total investment salary and wages for company $_j$
$SC_j = VA_j - HC_j$	is the Structural capital for company $_j$

Value added (VA) for company $_j$ $VA_j = I_j + DP_j + D_j + T_j + M_j + R_j$ is calculated as the sum of (a) Interest Expenses (I_j), (b) Depreciation Expenses (DP_j), (c) Dividends (D_j), (d) Corporate Taxes (T_j), (e) Equity of minority shareholders in net income of subsidiaries (M_j), and (f) Profits retained of the year (R_j).

Several key reasons support the use of the $VAIC_j^{TM}$ as the proxy of Intellectual capital (for a detailed presentation see: Roos *et al.,* 1997; Pulic, 1998; Pulic and Bornemann, 1999; Bontis *et al.,* 1999; Sullivan, 2000; Williams, 2001).

The Dependent variables

As we mentioned earlier, we examine the association between Intellectual capital and traditional measures of corporate performance. In the previous section we discussed the independent variable, the $VAIC_j^{TM}$. Here we'll explain the dependent variables; the profitability, the productivity and the market valuation measure.

Although the literature presents various accounting (e.g. EPS, ROI) and value based (e.g. EVA) performance measures that can be used as a proxy to capture the respective properties of the three dependent variables, we focus on the same measures used by Firer and Williams (2003) mainly for comparison purposes. Thus, we used the following dependent variables:

Return on Assets (*ROA*) represents the profitability. It is the ratio of the Net income divided by Book value of total assets as reported in the annual reports. *ATO* represents the productivity. It is ratio of the total revenue to total book value of assets as reported the annual reports. Finally, the *MB* represents the market valuation and is the ratio of the total market capitalisation divided by the Book value of net assets.

The Control variables

Although a selection of control variables could be used to complete the regression models we're going to test we are focused on the same control variables used by Firer and Williams (2003) mainly for comparison reasons (however, the control variables can be enhanced). So, we examine (a) the *size of the company*, (b) the *Leverage*, (c) the financial performance, and (d) the *Industry type*. Those variables are calculated as follows:

a) The *size of the company* (*Size*): Is the natural logarithm of the total market capitalisation.

b) The *Leverage* (*Lev*): Is the total Debt divided by Book value of total assets as reported in the annual reports.

c) The financial performance is represented here by the *Return on Equity* (*ROE*): Is the ratio of the Net income divided by Book value of Total shareholders' equity as reported in the annual reports.

d) The *Industry type* represents four major industries within the service sectors such as Banking (*BANK*), Electrical (*ELEC*), Information Technology (*IT*), and Services (*SER*).

The Regression models

Thus, the regression models are formed as follows:

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The Statistical tests

To explore the variables under examination we'll firstly conduct the descriptive statistic test showing the mean, median and standard deviation. Then we'll employ correlation analysis to explore the relationship between the dependent and independent variables. Pearson pairwise correlation will support our study. Finally, we'll run the three linear multiple regressions to explore the degree the VAIC components and the control variables affect profitability, productivity and market valuation.

4. The Empirical Results

This study has not been completed yet. Since the data collection and variable calculation are rather time consuming we estimate to have our first results by the end of the year. However, in the following we'll describe the sample selection and preliminary results of a part of companies from Greece. Still we need the completed data from Greece and from Austria.

The sample

The sample consists of publicly traded companies in Greece and Austria. Data fro the fiscal years of 2005, 2006 and 2007 will be selected from companies included in the four sectors under examination (Banking, Electrical, Information Technology and Services). However, to further extend this study we will select data and from other sectors such as Energy, Food Industry, etc.

Preliminary results

Results from a sample of 58 listed companies in the Athens stock Exchange showed the following results:

Pearson pairwise correlations indicated a significant positive association between profitability (ROA) and HCE and SCE respectively. Moreover, positive significant correlations are reported between productivity (ATO) and HCE and SCE respectively. Market valuation seems also (in higher degree) to be positively associated with CEE, HCE and SCE respectively.

Results from the **Linear Multiple Regressions** are shown in table I: Productivity (Panel B) and Market Valuation (Panel C) regression models are highly significant at 1 per cent level, while the Profitability (Panel A) model is statistically significant at 10 per cent level. The adjusted R^2 vary from 15,8 per cent (profitability) to 38,4 per cent (market valuation).

For the productivity regression model (panel A) only the coefficients representing HCE, SCE and BANK are statistically significant (with positive directional signs). The same results are revealed for the productivity regression model as far as HCE and SCE are concerned. As for the control factors, Size and Lev are statistically significant with positive signs too. Finally, the market valuation regression model (panel C) seems to be more explanatory. All independent variables are statistically significant at 1 and 5 per cent significant level, and moreover, three control factors (Size, Lev and BANK) seems to be significant at 1, 5 and 10 per cent levels.

5. Conclusions

Preliminary results revealed a rather satisfactory association between Intellectual Capital and corporate performance measures in the Greek context, with quite many variations. More specifically, Market Valuation seems to be higher associated with Intellectual Capital than profitability and productivity. However, we cannot completely support those results since the research is still in process. Moreover, results from Austria are expected to give us more insights in the issue.

Table I: Linear Multiple Regressions (year 2006)

	A		B		C	
	Profitability		Productivity		Market Valuation	
n	58		58		58	
Adjusted R sq.	0,158		0,278		0,384	
F-statistics	1,889		3,749		6,233	
Significance	0,072		0		0	
	Std.	t-stat.	Std.	t-stat.	Std.	t-stat.
Intercept		3,876		4,234		-4,965
Independent variables						
CEE					0,552	1,543*
HCE	0,134	1,045**	1,221	1,543*	-0,213	2,125**
SCE	0,189	2,454**	-0,342	3,232**	-1,905	1,543**
Control factors						
Size			2,658	2,687***	1,095	2,583*
Lev			3,658	1,835**	2,095	0,345**
ROE						
BANK	4,812	2,234*			4,095	2,673***
ELEC						
SER						

* significant at 1% level, ** significant at 5% level, *** significant at 10% level

Further, this study aims: (for years 2005 – 2007)

- to test the Greek and Austrian samples separately (for years 2005 – 2007)
- to test the Greek and Austrian samples as one (for years 2005 – 2007)
- to add more control variables in the regression models
- to extend the study in countries with economies in transition

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